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Atty Dkt **212722.00104** PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	:	Examiner: C. Grant
DAOZHENG LU, ET AL.	)	
	:	Group Art Unit: 2611
Application No.: 09/076,517	)	
	:	
Filed: May 12, 1998	)	
	:	
For: AUDIENCE MEASUREMENT SYSTEM FOR DIGITAL TELEVISION	)	August 26, 2002

Commissioner for Patents
Washington, D.C. 20231

DECLARATION OF MICHAEL A. DOLAN

I, Michael A. Dolan, a U.S. citizen residing at 20239 Japatul Rd, Alpine, CA 91901, hereby declare and state that:

1. My professional qualifications are stated in the attached Curriculum Vitae of Michael A. Dolan. In addition, I chair the SMPTE Technology committee on Data Essence, and the ATSC Specialist Group on Data Broadcasting.

2. I consider myself an expert in the art of broadcast signal technology.

3. I have recently studied certain patent application file documents for the subject application, which were provided to me by the Applicants' legal counsel. These documents include copies of the U.S. Patent Application No. 09/076,517 (hereinafter "the '517 Application"), and its U.S. Patent and Trademark Office file history, including the March 5, 2002 Office Action. In that Office Action, Claims 70 and 71 were rejected under 35 USC § 112, first paragraph, for the four reasons noted at pages 2-3 of the Office Action.

4. I am informed that the U.S. patent laws require that the patent specification contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to make and use the invention. In my expert opinion, the '517 Application provides such a description with respect to at least the four points set forth in the Office Action, as will be discussed below:

5. "And Radio"

It is my expert opinion that the person of ordinary skill in the broadcast signal technology art, studying the '517 Application, would conclude that, as of the time of the '517 Application's filing date, the specification provides proper enablement and written description support for the claimed feature wherein the claimed audience measurement system applies to digital television **and radio**.

The reasons for my opinion are as follows. First, Page 1, lines 10-11 of the specification clearly discloses the monitoring of radio and television signals: "... the addition of an identifying code to a **radio** or television program... ." Second, Applicants have amended the specification at pages 53-54 to include disclosure from incorporated-by-reference U.S. Patent No. 5,594,934 (*Daozheng Lu*, et al.). This disclosure (which I understand forms part of the originally filed application) clearly teaches that the disclosed audience measurement system is for television and **radio**.

Finally, the leading business alliance for broadcast signals is the National Association of Broadcasters, which represents both television and radio broadcasters alike. So, in addition to the obvious technical relationship, there is a close and obvious business relationship between the two medium.

Accordingly, since the '517 Application discloses the monitoring of **radio** signals at page 1, and since pages 53-54 provide a detailed discussion of the monitoring of **radio** signals, it is my expert opinion that the person of ordinary skill in the broadcast signal technology art would conclude that the '517 Application provides proper enablement and written description support for the "**and radio**" feature in new dependent Claim 159.

6. "A Control Stream"

It is also my expert opinion the person of ordinary skill in the broadcast signal technology art, studying the '517 Application, would conclude that, as of the time of the '517 Application's filing date, the specification provides proper enablement and written description support for the claimed feature wherein the multiplexed digital data transmission includes **a control stream** having an identification code.

The reasons for my opinion are as follows. First, the '517 Application teaches, in numerous places (such as the sentence bridging pages 42-43, the sentence bridging pages 43-44, and page 44, lines 14-19), the receiving and processing of an **ATSC bitstream.** The ISO 13818-1:1996 (MPEG-2 Systems) and ATSC (Advanced Television Systems Committee) Program/Episode/Version Identification Standard (A/57) from

August 30, 1996 (both prior to the filing date of the '517 Application) clearly teach the ordinarily skilled artisan that the ATSC bitstream (derived from MPEG-2) includes a control stream that has a program identification code. See, for example, the attached A/57 document paragraphs 4.2, 4.4, and 4.5, which refer to a Program Identifier Stream, clearly referring to the program identification code in the control stream. See also the attached SCTE DVS 136 (published May 5, 1998), which specifically refers to a "**control stream**" in paragraph G3. Thus, the ordinarily skilled artisan would understand the '517 specification as disclosing a **control stream** having an identification code.

Second, the '517 Application itself clearly teaches, in the paragraph bridging pages 46-47, that the software agent determines whether a received "data packet has a decodable packet label including a decodable **program identification code.**" The specification goes on to teach that: "This program identification data packet is expected to be a feature in digital television programming,…", obviously referring to the above-discussed ATSC specification. Clearly, the "control stream" is the "data packet" having the "decodable packet label" that includes the "program identification code."

Accordingly, since the '517 Application clearly refers to an ATSC bitstream which is known to have a **control stream,**

and since the '517 Application itself clearly discloses a "data packet" having the "decodable packet label" that includes the "program identification code", it is my expert opinion that the person of ordinary skill in the broadcast signal technology art would conclude that the '517 Application provides proper enablement and written description support for the multiplexed digital data transmission including a **control stream** having an identification code.

7. "When Reception ... by the Receiver Begins"

It is also my expert opinion that the person of ordinary skill in the broadcast signal technology art, studying the '517 Application, would conclude that, as of the time of the '517 Application's filing date, the specification provides proper enablement and written description support for extracting the identification code ... **when reception of the first (and subsequent) channel by the receiver begins.**

The reasons for my opinion are as follows.

First, extracting program identification information "when reception of the channel by the receiver begins" is recognized by those of ordinary skill in the art as being part of any label acquisition by a receiver, including its

application to TV audience measurement systems at the time the subject application was filed. For example, the *1987* U.S. Patent No. 4,697,209 (David Kiewit and *Daozheng Lu*, et al.), teaches "monitoring the on and off and other functions of the television receiver" (Column 5, lines 46-49), and the extraction of program identification signatures in response thereto (Column4, line 27 through Column 8, line 59).

Second, the DTV set 110 of Figure 3 obviously includes a receiver and runs a software agent 118 to measure audience participation. (See Pages 25-26 of the specification.) Page 46 of the specification teaches that the Figure 7 software agent 500 can be used for the software agent 118.

Referring to Figure 7 and the specification at pages 46-48, when reception by the TV receiver begins, the step 506 determines whether the data packet has a decodable packet label (including a program identification code). If the data packet does not have a decodable packet label (e.g., the TV receiver has just been turned ON), the step 508 logs (records) the TV receiver as being ON, and then loops the program back through step 506 until a decodable packet label (i.e., one with a program identification code) is found. Once found, the program proceeds to the step 510 where it is determined whether the decodable packet label is the same as the previous one. The answer to this step is NO when the TV receiver is first turned

ON, and the program then proceeds to step 512 where the program identification code is extracted and the corresponding program name and time are logged (recorded). Thus, the program identification code in the decodable data packet is extracted when the TV receiver begins receiving a first channel.

Accordingly, since the specification clearly discloses the extraction of the identification code **when reception of the first channel begins**, it is my expert opinion that the '517 Application provides proper enablement and written description support for this claimed feature.

Returning to Figure 7, when the TV channel is changed, the program proceeds through step 506 to step 510. The step 510 determines that the program identification code in the decodable packet label is different from the previous one (before the channel was changed), and proceeds to step 512 where the new program identification code is extracted and the new TV program name and time are logged (recorded). Thus, the program identification code in the decodable data packet is extracted when the TV receiver begins receiving a subsequent channel.

Accordingly, since the '517 Application clearly discloses the extraction of the identification code **when reception of a subsequent channel by the receiver begins**, it is my expert opinion that the '517 Application provides proper

enablement and written description support for this claimed feature also.

Therefore, it is my expert opinion that the person or ordinary skill in the broadcast signal technology art would conclude that the '517 Application provides proper enablement and written description support for extracting the identification code ... **when reception of the first (and subsequent) channel by the receiver begins.**

8. "Recording the Time When Reception by the Receiver is Ended"

It is also my expert opinion that the person of ordinary skill in the broadcast signal technology art, studying the '517 Application, would conclude that, as of the time of the '517 Application's filing date, the specification provides proper enablement and written description support for **recording the time that the reception by the receiver is ended.**

The reasons for this opinion are as follows.

First, recording the time "when reception by the receiver ends" is recognized by those of ordinary skill in the art as being part of TV audience measurement systems at the time the subject application was filed. For example, the above-discussed 1987 U.S. Patent No. 4,697,209 teaches, "a signature is extracted each time an Event 2 (which includes television

receiver on and off events) is detected. The signature, as well as the times of occurrence of the signatures are stored to form a library of reference signatures." (Column 3, lines 58-63).

Second, the '517 Application clearly teaches that change-of-status events cause the recording of all available information: "block 516 (Fig. 7) logs as much detail as is available..." (See Page 48, second-to-last line.) Step 512 clearly shows that "available information" includes time. That the receiver being turned OFF is a change-of-status event is evident to the person of ordinary skill in the art.

Third, the Applicants have amended the specification to include disclosure from incorporated-by-reference U.S. Patent No. 5,481,294 (William Thomas and *Daozheng Lu*). This disclosure (which I understand forms part of the originally filed application) clearly teaches that the disclosed audience measurement system records the time that the receiver undergoes an ON/OFF change.

Accordingly, since the specification teaches that all "available information" (including time) is recorded at change-of-status events, and since the specification also discloses the recording of the time that the receiver undergoes an ON/OFF change, it is my expert opinion that the '517 Application provides proper enablement and written description support for **recording the time that the reception by the receiver is ended.**

9. For the reasons set forth above, it is my expert opinion that the '517 Application contains a written description of the invention (including the four features discussed above), and of the manner and process of making and using them, in such full, clear, concise, and exact terms as to enable any person skilled in the art to make and use the invention.

10. I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code.

21-August-02
Date

Michael A. Dolan

Curriculum Vitae of

Michael A. Dolan

Summary of Skills:

Broadcast Digital Television Signal Standards & Technology, Software Business Development, Software Technology Licensing/Contracts, System Architecture.

Mr. Dolan has been active in the standardization of television data broadcasting for the last 3 years, and he now chairs several relevant technical groups within SMPTE and ATSC on this topic. He is therefore a leading authority on the technology in this emerging field. In addition to data broadcasting, he is also knowledgeable in the system information for the MPEG transport, including ISO 13818-1, ATSC A/65 (PSIP) and A/90 (ATSC Data); as well as DVB 400-368 (DVB-SI), DVB 301-192 (DVB Data).

Mr. Dolan is also an expert in some internet and web technologies, including IP Multicast and HTTP protocols.

During his years as an executive at emerging high tech companies, he specialized in leading edge architecture and software development, as well as software intellectual property licensing and its business aspects.

Design and development projects related to digital television include DSM-CC video on demand (VOD) system including U-U as well as UN protocols; and MPEG transport analysis and bitstream generation tools designed for system testing. Mr. Dolan also led a software development project for the client and protocol development of an early television data broadcasting system (not deployed for business reasons).

Experience:

1/92 - 1/95, 3/96 - present. **Consultant and Founder** of TerraByte Technology. The business provides consulting services in the skill areas listed above. It also develops, markets and sells vertical-market software products. Significant projects involve television standards work representing DIRECTV, development of MPEG transport bitstream generator tools, development of DSM-CC video on demand systems, and miscellaneous technical and architectural efforts related to data enriched TV broadcasting.

1/95 - 3/96. **Vice President** for Network Computing Devices (NCD). **VP Technology** guiding original architecture and design of the internet browser product, Mariner. Later as **VP Engineering**, responsible for managing 75 people in the NCD Software business division, including Mariner, PCX, and Z-Mail product lines; and responsible for all of development, documentation and QA functions.

4/84 - 1/92. **President, Chairman/VP Technology** for AGE (now a wholly owned subsidiary of NetManage). Founded and ran the business which developed, marketed and licensed X Window System embedded servers to all early X terminal vendors such as HP, IBM, NCR, etc. Recruited CEO and assumed chief technical role. Early days of company specialized in real-time and graphics software, including technical consulting.

4/83 - 4/84. **Software Engineer and Product Manager** for Syte Information Technology (now defunct startup). Worked on first product plans, designed and developed object-oriented window software in C. Company manufactured UNIX workstations, including a proprietary, object-oriented, UNIX-like OS, based on Smalltalk.

9/79 - 4/83. **Special Products Engineering Manager and Product Marketing Manager** for Megatek (now a wholly owned subsidiary of Peritek Corp). Developed product line marketing plans. Started and ran small profit center for customized engineering products. The company designed and manufactured medium and high-end computer graphics terminals for the early CAD industry.

6/75 - 9/79. **Software Engineer Coop** for Naval Research Lab (NRL). Designed and developed real-time data-acquisition and computer graphics software for ocean acoustics applications.

6/75 - 8/79. **Television Studio Technician (Part Time)** for Virginia Tech Campus Television Station. Maintained studio equipment and (cable) distribution system.

6/74 - 6/75. **Federal Junior Fellow** for US Patent and Trademark Office. Assisted with examination, research and response to television patent applications.

Education:

BSEE 1979, Magna Cum Laude Virginia Tech. Emphasis on real-time control systems, computer graphics and mathematics.

Misc course-work in **MSEE and MSCS programs** at Virginia Tech and University of California, San Diego respectively from 1979-1982. (Advanced degrees not completed due to startup company employment work-load.)

Patents:

- US#5801702, "Integrated Network Access User-Interface System and Method"
- US#5963208, "Integrated Network Access User Interface For Navigating with a Hierarchical Graph"
- (others pending in the same field of web browser technology)

Books:

- McGraw-Hill, "Data Broadcasting: Understanding the ATSC Data Broadcast Standard", 0-07-137590-2, 2001

Papers:

- *Data Broadcasting Standards Overview*, NIST/ATSC Symposium: End-to-End Data Services, Interoperability and Applications, Jun '01
- *IP Multicast on ATSC Transports - An Application of A/90*, ATSC PSIP & Data Broadcast Seminar, Feb '01
- *Data Broadcasting Standards Overview*, SMPTE Conference on Ancillary Data, Metadata, and Datacasting, Feb '01
- *IP Multicast on ATSC Transports - An Application of A/90*, ATSC PSIP & Data Broadcast Seminar, Nov '00
- *The Convergence Challenge for Data Essence*, Digital Hollywood Conference, Sept '00
- *Declarative Data Essence*, World Television Forum Conference, Jun '00
- *An Integrated Approach to the Internet*, Web World Conference, Aug '95
- *Integrating Email with the Web*, Web World Conference, Apr '95
- *SARMAP, A Graphical Search Management Tool*, NASAR Conference, Jun '94
- *SARDAT, A Search Database (co-author)*, NASAR Conference, Jun '94
- *X Window System Server Testing and Benchmarking Methodologies*, The X Journal, Jan/Feb '92.
- *X Window System Server Testing and Benchmarking*, Xhibition Conference, Jun '91
- *X Window System Servers in Embedded Systems (co-author)*, CompCon Conference,Spring '90.
- *Adding Local Intelligence to Graphics Terminals*, Mini-Micro Systems, Jan '82
- *Minicomputer Automation for an Electronic Autobalance*, Mar '79

Current Digital Television Standards Activity:

- Chairman, SMPTE D27/DDE, Declarative Data Essence AHG.
- Chairman, ATSC T3/S18, Application Reference Model
- Active in ITU JRG-1 and other ATSC and SMPTE groups related to television data broadcasting.

Doc. A/57
30 Aug 96

PROGRAM/EPISODE/VERSION IDENTIFICATION

ATSC STANDARD

ADVANCED TELEVISION SYSTEMS COMMITTEE

PROGRAM/EPISODE/VERSION IDENTIFICATION

ATSC Standard

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FOREWORD

This standard was prepared by the Advanced Television System Committee (ATSC) Technology Group on Distribution (T3). The document was approved by the members of T3 on 11 July 1996 as a full ATSC normative standard. The document was approved by the Members of the ATSC on [30 Aug 96].

1. SCOPE

The Program/Episode/Version Identification (Program Identifier) standard provides a means of uniquely defining a program, episode, version, and source within the MPEG-2 syntax. The standard provides for a program identifier data packet that may be inserted into the Transport Stream at random intervals. A specific PID is assigned to the program identifier data packets that appear in the Transport Stream for each program. This PID is identified in the PMT. The program identifier packet contents may vary to allow specific identification of the separate component works (e.g. programs, commercials, and materials of a promotional nature) that make up the program.

This document provides a detailed specification of the syntax required. A unique Program Identifier may be useful for program verification.

2. REFERENCES

The Program/Episode/Version Identification syntax is based on the ISO/IEC MPEG-2 Systems Standard and is compatible with the requirements of the ATSC Digital Television Standard.

ATSC Standard A/53 (1995), Digital Television Standard.

ATSC Standard A/55 (1996) Program Guide for Digital Television.

ISO/IEC IS 13818-1, International Standard (1994), MPEG-2 systems.

3. DEFINITIONS

3.1 Definitions

With respect to definition of terms, abbreviations and units, the practice of the Institute of Electrical and Electronic Engineers (IEEE) as outlined in the Institute's published standards shall

be used. Where an abbreviation is not covered by an IEEE practice or industry practice differs from IEEE practice, then the abbreviation in question will be described in Section 3.4 of this document. Many of the definitions included therein are derived from definitions adopted by MPEG.

3.2 Compliance notation

A used in this document, "*shall*" or "*will*" denotes a mandatory provision of the standard. "*Should*" denotes a provision that is recommended but not mandatory. "*May*" denotes a feature whose presence or absence does not preclude compliance, that may or may not be present at the option of the implementer.

3.3 Treatment of syntactic elements

This document contains symbolic references to syntactic elements used in transport coding subsystems. These references are typographically distinguished by the use of the underscore (e.g. TS_program_map_section) and may consist of character strings that are not English words (e.g. uimsbf).

3.4 Terms employed

bslbf - Bit string, left bit first, where "left" is the order in which the bit strings are written in the Standard. Bits strings are written as strings of 1s and 0s within single quotation marks, e.g. '1000 1001'. Blanks within a bit string are for ease of reading and have no significance.

Uimsbf - Unsigned integer, most significant bit first.

Rpchof - Remainder polynomial coefficient, higher order first.

4. PROGRAM/EPISODE/VERSION IDENTIFIER

4.1 Introduction

In MPEG-2 System bit streams, the Program Map Table (PMT) PID for each program in the bit stream can be identified from PID 0.

In the MPEG-2 and ATSC standards, the PID for each program bit stream must remain constant. However, a requirement to uniquely identify the component works (e.g. program, commercial, promo, etc.) used to assemble the program bit stream has been recognized.

The method of unique identification employed in this standard assigns a **program_identifier_descriptor** to each work. The **program_identifier_descriptor** for each work shall be carried in a Program Identifier Table (PIT) within a Program Identifier Stream.

This Program Identifier Stream shall be identified in the PMT as described below.

The **stream_type** shall be set to 0x85 (one of the ATSC reserved stream types).

The **elementary_PID** shall indicate the PID number carrying the Program Identifier Table (PIT). In this way the PID can remain constant for each program stream but the data packets carrying the unique identifiers assigned to the different component works that constitute the program stream can be inserted as required and when appropriate. This is similar to the method used to identify program related video and audio services, in that, video and audio packets are identified, as such, with the packets appearing as appropriate to support the service with the contents (payload) of the packets varying as appropriate.

4.2 The Program Identifier Stream

The Program Identifier Stream consists of Transport Packets carrying **program_identifier_table_section** structures, each of which define a PIT. The PIT is a general-purpose structure designed to carry one or more program-related structures. For the purpose of this standard, each instance of the PIT carries one **registration_descriptor** identifying the Registration Authority followed by one **program_identifier_descriptor** described below and in Section 4.4.[1]

Table 1 Bit Stream Syntax for the Program Identifier

Syntax	Bits	Format
program_identifier_table_section() {		
table_id	8	0xD0
section_syntax_indicator	1	'0'
private_indicator	1	'1'
reserved	2	'11'
private_section_length	12	uimsbf
for (i=0; i<N, i++) {		
descriptor ( )		
}		
CRC_32	32	rpchof
}		

The PIT is carried in a single Transport Packet with a PID identified in the PMT_PID and obeys the syntax and semantics of the Private Section as described in Sections 2.4.4.10 and 2.4.4.11 of ISO/IEC 13818-1. The following constraints apply to the Transport Packet carrying the PIT:

PID shall have the value identified in the PMT_PID as described above.

transport_scrambling_control bits shall have the value '00'.

[1] A future standard could define, in a backwards-compatible way, additional descriptors.

adaptation_field_control bits shall have the value '01'.

payload_unit_start_indicator shall be 1.

pointer_field shall have the value 0x00.

the remainder of the Transport Packet after the PIT section shall be padded with stuffing bytes of value 0xFF.

4.3 The Registration Descriptor

The registration authority shall be the Society of Motion Picture and Television Engineers (SMPTE). A registration descriptor identifying SMPTE as the registration authority shall be carried in the PIT in conjunction with the **program_identifier_descriptor.**

The registration_descriptor identifies the registration authority that assigns a block of numbers identified by the **provider_index** to major content providers and/or distributors and individual **program_event_id**'s to individual program events as appropriate.

Table 2 Bit Stream Syntax for the Registration Descriptor

Syntax	Bits	Format
registration_descritor ( ). {		
descritor_tag	8	0x05
descriptor_length	8	uimsbf
format_identifier	32	0x0000 0034
for i=0, i<N, i++ {		
additional_identification_info	N*8	bslbf
}		
}		

Semantics of the fields are as follows:

registration_descriptor - This ISO/IEC 13818-1 descriptor identifies the registration authority for the **program_identifier_descriptor**.

descriptor_tag - This 8 bit unsigned integer field shall have the value 5, identifying this descriptor as a registration_descriptor.

descriptor_length - This 8 bit unsigned integer field specifies the number of bytes of the registration_descriptor immediately following descriptor_length field.

format_identifier - This 32 bit field identifies the registration authority that assigns the provider_index field within the program_identifier_descriptor and shall have the value 52

(0x00000034) which is the ISO/ITU number assigned to SMPTE.

4.4 Program Identifier Descriptor

The **program_identifier_descriptor** uniquely identifies a program (or a program segment) and may provide additional program details. The default condition, where the **provider_index** is 0x0000 and the **program_identifier_descriptor** is 0x000000, is considered the null condition and may be used to reserve space in the data stream for possible future extensions.

Table 3 Bit Stream Syntax for the Program Identifier

Syntax	Bits	Format
program_identifier_descriptor ( ) {		
descriptor_tag	8	0x85
descriptor_length	8	uimsbf
provider_index	16	uimsbf
program_event_id	24	uimsbf
episode_field_indicator	1	bslbf
episode_date_indicator	1	bslbf
ISAN_field_indicator	1	bslbf
reserved	5	'00000'
if (episode_field_indicator==1) {		
if (episode_date_indicator==0) {		
episode_number	12	uimsbf
version_number	12	uimsbf
}		
else if (episode_date_indicator==1) {		
original_date_year	8	uimsbf
original_date_month	8	uimsbf
original_date_day	8	uimsbf
}		
program_id_string_length	8	uimsbf
program_id	s*8	uimsbf ISO Latin-1 char.
}		
if (ISAN_field_indicator==1) {		
ISAN_field	72	uimsbf
}		
}		

Semantics of the fields are as follows:

program_identifier_descriptor - This descriptor, in conjunction with the registration_descriptor, uniquely identifies the program and the event.

descriptor_tag - This 8 bit unsigned integer field shall have the value 133 (0x85), identifying this descriptor as program_identifier_descriptor. (This descriptor_tag is one of the reserved tags in the ATSC Digital Television Standard, see section 5.7 in Annex C of ATSC A/53).

descriptor_length - This 8 bit unsigned integer field specifies the number of bytes of the

program_identifier_descriptor immediately following descriptor_length field. The value shall range from 6 to 59 (0x06 to 0x3B).

provider_index - This 16 bit unsigned integer field identifies the provider that assigns the program_event_id numbers for the block of numbers. The unique number is registered within the registration authority as identified by the registration_descriptor. This field shall have the same value as the provider_index field in the Channel Information Table of ATSC Standard A/55, "Program Guide for Digital Television.

program_event_id- This 24 bit unsigned integer field identifies the program or product. The value of this number is assigned by the provider, as identified by the provider_index. The 24 bit field allows up to 16,777,216 unique programs per provider. This field shall have the same value as the program_event_id field in the Event Information Table of the ATSC Standard A/55, "Program Guide for Digital Television". A value of 0x000000 in association with provider_index value of 0x0000 indicates a null field.

episode_field_indicator - This 1 bit flag signals the existence of the episode_number and version_number or the episode date fields, and the program_id_string. If the episode_field_indicator = 0 then those fields do not exist. In this case episode_date_indicator shall be set to 0.

episode_date_indicator - This 1 bit flag signals the use of the 24 bit episode field. If the episode_date_indicator = 1, then the episode field is used to indicate the date of first presentation (original_date) year, month, and day. If the episode_date_indicator = 0, then the 24 bit episode field is used to indicate an episode (first 12 bits) and a version of the episode (second 12 bits).

ISAN_field_indicator - This 1 bit flag signals the existence of the ISAN_field. ISAN (International Standard Audiovisual Number) is a identification system used for certain audio/visual properties (see description of ISAN_field, below).

episode_number - This 12 bit unsigned integer number identifies the episode number of the production (1 to 4095 inclusive). Default = 0x000.

version_number - This 12 bit unsigned integer number identifies the version of the production or episode (1 to 4095 inclusive). Different versions of the program/production may be assigned for different languages, program lengths, different titles for the same program/product, etc. For instance, a film product may be released as a 120 minute version in English for North American theatrical release, a 180 minute version in French for European theatrical release, and a 110 minute release in English and French for use on Canadian television. Default = 0x000.

original_date_year - This 8 bit unsigned integer number represents the offset from 1900 to the year of first presentation. (Year minus 1900: e.g. if first presentation was 1984, the

original_date_year would have a value of 84 or 0x54).

original_date_month - This 8 bit unsigned integer number represents the month of the year of first presentation. (1: January - 12: December).

original_date_day - This 8 bit unsigned integer number represents the day of month of first presentation (1-31).

program_id_string_length - This 8 bit unsigned integer number represents the length of the optional **program_id_string** to follow. The length may range from 0 (indicating a null string) to a maximum of 40.

program_id_string - A sequence of zero to 40 characters which represent a human-readable version of the Program Identifier. The characters are coded according to ISO/IEC 8859-1 (Latin-1). The **program_id_string** is not intended for display or processing by consumer equipment; it may be provided by the creator of the **program_id_string** as a human-readable reference check on the Program Identifier.

ISAN_field - The 9 byte optional field may be used to cross-reference the ISAN number for the program when one exists. ISAN is an identification system used for certain audio/visual properties. It consists of a 16 digit integer number coded in bcd (binary-coded-decimal) notation in a 64 bit (8 byte) string. The most significant byte of the ISAN_field is used to carry the ISAN registration authority eight bit value.

4.5 STD Model for the Program Identifier Streams

The program identifier streams are assigned stream_type 0x85 and use the same format as the private section of ISO/IEC 13818-1 (with stream_type = 0x05) including the 32 bit CRC field. The following constraints shall apply:

The Program Identifier Stream shall adhere to an STD model that can be described by an MPEG-2 smoothing buffer descriptor (Section 2.6.30 in ISO/IEC 13818-1) with the following parameters:

sb_leak_rate shall be 3 (indicating a leak rate of 1200 bits/s).

sb_size shall be 512 (indicating a smoothing buffer size of 512 bytes).

ANNEX A

Informative

GUIDE AND PRACTICE

1. INTRODUCTION

There is a requirement for a standard mechanism that provides a unique program (or production) identifier within the MPEG-2 transport. The MPEG standard 13 bit packet identification field (PID) provided for in the syntax is limited in the number (8192) of unique values. Further there is no restriction on how numbers may be assigned and reassigned by original producers and/or the end service providers. In fact, a single video broadcast service should assign the same PID number to all segments (programs, commercials, and promos) provided as part of a single program service stream to assure undisturbed continuity of display at the receiver. This results in there being a strong probability that different program content provided by different producers and service providers will be distributed using the same PID value. Unique identifiers are essential as they provide a mechanism that assists in the verification of clearance, automated program selection and recording, and protection of intellectual property rights.

MPEG anticipated such a need and provided tools within the Transport Layer syntax. The Program Map Table (PMT) allows for inclusion of program stream descriptors which allow additional description of each program contained in the table or to pointers to data packets that contain additional information.

The Program/Episode/Version Identification (Program Identifier) standard provides a means of uniquely defining a program, episode, and version and uses the latter technique.

2. APPLICATION

The descriptor provided for in this standard allows for the unique identification of each version of an episode or program or production using a 64-bit code. The code is divided into three fields consisting of a 16-bit **provider_index**, a 24-bit **program_event_id**, and a 24-bit episode and version identifier.

A 16-bit **provider_index** allows for 65,536 different blocks of 24-bit **program_event_id** numbers. This 16 bit unsigned integer field can be used to identify the original provider that assigns the **program_event_id** numbers for the block of numbers.

The 24-bit **program_event_id** field combined with the 16-bit **provider_index** uniquely identifies the program or product. The 24 bit field allows up to 16,777,216 unique programs per **provider_index** block for a total of >1.099 x 10^{12} (65,536 x 16,777,216).

The third field is an optional field of 24-bits that can be used to indicate either the date of the first presentation of the program or production (as might be desirable for use with news programming) or it can be used to indicate an episode and/or a version of the production. The field allows up to 4095 episodes of the program or production to be identified with up to 4095 different versions of each episode or production.

3. ASSIGNMENT OF PROVIDER_INDEX AND PROGRAM_EVENT_ID

The assignment of **provider_index** and **program_event_id** numbers is controlled by the registration authority. The registration authority is the Society of Motion Picture and Television Engineers (SMPTE) located at 595 West Hartsdale Avenue, White Plains, New York 10607-1824 (Telephone: +1 (914) 761-1100), HTTP://www.smpte.org. The standard allows the registration authority to assign one or more of the 65,536 **provider_index** numbers to major producers who in turn will assign **program_event_id** numbers to the individual program segments that they produce, distribute or otherwise administer. The registration authority may also reserve some of the **provider_index** numbers for its own administration. In this case the registration authority may assign **program_event_id** numbers from these reserved blocks to individual program events where the source is organized to produce a single event or where the source wishes to remain anonymous. Alternatively, the registration authority may partition the 24-bit **program_event_id** numbers from some of those reserved blocks into sub-blocks and assign them separately to a multiplicity of providers who do not require the full range of 16,777,216 **program_event_id** numbers that are available with each **provider_index** number.

The registration authority (SMPTE) provides a list of all **program_event_id** numbers it assigns with the name of the producer and the descriptive material found in the 40 character **program_id_string** (see Section **6** below).

The 40-bit unique identification number (**provider_index** + **program_event_id**) can be assigned to the production or program either at the inception of the production, at the completion of the production, just prior to distribution, or at such time as the rights holder or the rights holder's agent deems appropriate. The production or program carries that unique number throughout its life regardless of change of rights holder, distribution mechanism, or the creation of different versions. (The method of handling different versions of the product is described in Section **5** below).

In summary, once a unique identification number is assigned to a production, it does not change even if there is a change in ownership.

4. TRACKING THE ASSIGNMENT OF PROGRAM_EVENT_ID_NUMBERS

The agreement between the registration authority (SMPTE) and other parties that are assigned **provider_index** numbers should provide for the other parties to list all **program_event_id** numbers that they assign with the descriptive material found in the 40 character **program_id_string** and to provide updated copies of the list at regular intervals either electronically or in hard-copy form to the registration authority.

The agreement should also provide a mechanism for the registration authority (SMPTE) to administer the **provider_index** block should the original other party either wish to give up its responsibilities or otherwise be unable to administer its responsibilities.

5. HANDLING OF DIFFERENT VERSIONS

The 12-bit **version_field** provides for up to 4095 different versions of the same episode or program or production and provides for identification of different program lengths, usage of different languages, products with different ratings, and alternate titles for different markets. For instance, a film product may be released as a 120 minute version in English for North American theatrical release, a 180 minute version in French for European theatrical release, and a 110 minute release in English and French for use on Canadian television. The 40-bit unique identifier is intended to tie all of the versions together for traceability.

6. PROGRAM_ID_STRING CONTENTS

The contents of the 40 character **program_id_string** may be assigned by the original producer and are available as a human-readable version of the Program Identifier. The **program_id_string** is not intended for display or processing by consumer equipment, but may be usable in broadcasting or studio equipment to verify that the selected Transport Stream contains the proper program components.

7. USAGE

7.1 The **registration_descriptor** and the **program_identifier_descriptor** together provide the syntax for the unique identifier and are intended to be used together.

7.2. The intention is to never to reuse the 40-bit unique identification number (**provider_index** + **program_event_id**) at least, within the first 150 years of use.

7.3 It is suggested that the packets containing the unique identification number appear early in the Transport Packet data stream and at regular intervals thereafter on the order of once every 30 seconds to 2 minutes. It is further recommended that in each instance, the packets be repeated twice at 0.5 second intervals thereafter as an assist in verification during times of interference.

7.4 It is suggested that in the case of commercials and other program streams containing promotional materials, the packets containing the unique identification number appear in the Transport Packet data stream toward the end of the work, starting at 2 or 3 seconds from the end and be repeated twice at 0.5 second intervals thereafter as an assist in verification during times of interference.

7.5 It is understood that there is nothing in this standard that requires consumer equipment to address the **Program Identifier Stream** packets or to decode the packets. However, consumer equipment that provides a Transport Packet data port should pass the **Program Identifier Stream** through the port with the remainder of the program (video, audio, and data) information. Since the **Program Identifier Stream** provides unique identification of the work, recording of the program should include the unique identifier.

7.6 Some parties had suggested that the time-to-show be included, but this is a distribution issue (varies with local broadcaster), is covered in the program guide, and has not found wide acceptance.

7.7 Users are advised not to assign bits for "intelligence" (i.e. first bit is for national commercials, following six bits identify program length, etc.), this information can be found in a program guide or in extension bits; and could be used by others to automate the removal of commercials and other content of a promotional nature.

8. ADMINISTRATION

8.1. SMPTE is the registration authority for the unique product identifier. SMPTE is an international organization comprised of individual members in 72 countries. SMPTE serves the ISO as the Chair and the Secretariat for TC 36 (cinematography). SMPTE serves the IEC as the U.S. Technical Advisor and TAG Administrator for IEC SC100B (recording). SMPTE is recognized by the American National Standards Institute as the standards developer for television production and motion pictures. SMPTE has been serving the international community since 1916 and has an established presence. SMPTE members represent a broad range of disciplines representing the film, terrestrial broadcasting, cablecasting, direct broadcast, and common carrier industries. SMPTE is, therefore, industry and politically neutral.

8.2. Each block of numbers identified by **provider_index** number is assigned to program/content providers or to SMPTE to manage. SMPTE plans to establish mechanisms to provide registration services accurately and as part of a range of services already provided to the specific community targeted by the standard.

8.3 SMPTE intends to provide an active listing via the Internet of the 16-bit **provider_index** numbers with a cross reference to the institution managing the individual **provider_index** block. This would likely include a hyperlink capability to the Web page of the institution managing the block to allow access to the 24-bit **program_event_id** listings within the block. For those blocks managed directly by SMPTE, the hyperlink access to the individual **program_event_id** listings would be obvious.

8.4 SMPTE and institutions wishing to manage individual blocks of **program_event_id** numbers should update the listings no less than once per business day.

8.5 For each work assigned a **program_event_id**, the hyperlink accessible listing should cross reference the name of the work, episode number, version information and any other descriptive material found in the 40 character **program_id_string**.